The views expressed in this paper are those of the author and do not necessarily reflect the views of the Department of Defense or any of its agencies. This document may not be released for open publication until it has been cleared by the appropriate military service or government agency.

STRATEGY RESEARCH PROJECT

A STRATEGIC ANALYSIS MODEL FOR CENTER OF GRAVITY DETERMINATION IN FULL SPECTRUM WARFARE

BY

LIEUTENANT COLONEL RALPH J. PERRY United States Army

DISTRIBUTION STATEMENT A:

Approved for Public Release. Distribution is Unlimited.



USAWC CLASS OF 2000

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

DTIC QUALITY INSPECTED 2

20000519 049

USAWC STRATEGY RESEARCH PROJECT

A STRATEGIC ANALYSIS MODEL FOR CENTER OF GRAVITY DETERMINATION IN FULL SPECTRUM WARFARE

by

Lieutenant Colonel Ralph J. Perry United States Army

> Professor Robert C. Coon Project Advisor

The views expressed in this academic research paper are those of the author and do not necessarily reflect the official policy or position of the U.S. Government, the Department of Defense, or any of its agencies.

U.S. Army War College CARLISLE BARRACKS, PENNSYLVANIA 17013

> DISTRIBUTION STATEMENT A: Approved for public release. Distribution is unlimited.

ii

ABSTRACT

AUTHOR:

Ralph J. Perry

TITLE:

A Strategic Analysis Model For Center Of Gravity Determination In Full Spectrum

FORMAT:

Strategy Research Project

DATE:

XX April 2000

PAGES: 27

CLASSIFICATION: Unclassified

There is currently no commonly accepted joint or interagency model to assist strategic planners in identifying and targeting strategic centers of gravities (COGs) of potential adversaries in full spectrum warfare anticipated in the future, to include foreign states and non-state entities. This paper will analyze the various definitions of COG commonly used today and propose a definition that better describes how the COG concept can be used in strategic planning. Additionally, this paper will provide a critical analysis of a model for COG determination and then propose an alternative model with wider application and increased simplicity. The new model is a three step process that includes determining possible COGs, conducting an evaluation using determinates to estimate the effectiveness and applicability in targeting these COGs, and finally applying instruments of national power that will achieve the desired change affect on the COG. This model uses the basic premise that any adversary can be examined as a system. Four COG categories are identified as an inherent part of any system: control mechanism, essential elements, the populace and enforcement mechanism. To demonstrate the feasibility and suitability of this model, a case study is used with North Korea as a possible adversary. This investigation reveals that the new model, called "Joint Strategic Analysis Model (JSAM), will provide strategic planners with a comprehensive tool for examining foreign states and other foreign entities as "systems" in the full spectrum of conflict and assist in determining and affecting our adversary's COGs.

iv

TABLE OF CONTENTS

ABSTRACTiii
ACKNOWLEDGEMENTS vii
LIST OF ILLUSTRATIONS ix
LIST OF TABLES xi
A STRATEGIC ANALYSIS MODEL FOR CENTER OF GRAVITY DETERMINATION IN FULL SPECTRUM WARFARE1
STRATEGIC THINKING AND CENTERS OF GRAVITY1
THE JOINT STRATEGIC ANALYSIS MODEL (JSAM)
COG EVALUATION AND CHANGE APPROACH6
APPLICATION AND STRATEGIC IMPLICATIONS9
CONCLUSION14
ENDNOTES
BIBLIOGRAPHY 17

ACKNOWLEDGEMENTS

I would like to thank Professor Robert Coon for his mentorship and guidance during this project. His professional guidance, coupled with an in depth understanding of center of gravity determination, were instrumental in expanding my views in this area and articulating them in this Strategic Research Paper. Additionally I would like to thank Professor Lenoard Fullenkamp for his keen insight into the strategic thinking process. During his course presentation, I became interested in this topic and sought out his guidance, which helped me develop and organize my thoughts. This was the impedance that led to my decision to explore the subject of center of gravity determination.

LIST OF ILLUSTRATIONS

FIGURE 1 – JOINT STRATEGIC ANALYSIS MODEL (JSAM)	3
. ,	
FIGURE 2 – WARDEN'S FIVE RING MODEL	
	••
FIGURE 3 – JSAM FOR KOREAN CASE STUDY	ç

X

,

LIST OF TABLES

TABLE 1 – INSTRUMENTS OF NATIONAL POWER	8
TABLE 2 - COG OBJECTIVE ANALYSIS	12
TABLE 3 – COG VULNERABILITY ANALYSIS	12
TABLE 4 – COG RISK ANALYSIS	13
TABLE 5 – DETERMINATES SUMMARY	13

A STRATEGIC ANALYSIS MODEL FOR CENTER OF GRAVITY DETERMINATION IN FULL SPECTRUM WARFARE

As strategic military planners, it is imperative that we obtain a complete understanding of potential enemies we may face in the future. In order to do this we can analyze our enemy as a system. This is not to imply that this analysis will produce a specific equation that will ensure success, but it will provide a tool that will facilitate strategic decision making in targeting an enemy to maximize the effectiveness of our resources. Chinese theorist Sun Tzu summarizes the significance of conducting an analysis of our enemy when he said "Know the enemy and know yourself, you need not fear the result of a hundred battles." ¹

STRATEGIC THINKING AND CENTERS OF GRAVITY

Before a military planner can begin thinking strategically about the enemy's center of gravity several critical questions must be answered. First and most important is what is our objective? The search for a COG of an adversary is meaningless unless it is directly related to what it is that needs to be accomplished. The engagement of two parties in conflict is serious in nature and would not have been initiated unless one party was trying to change something concerning the other party. The change being sought is of political value to one of the parties. Clausewitz wrote that war was an instrument of policy, "a continuation of political intercourse." This could apply to the conduct of a Major Theater War (MTW) on one end of the conflict spectrum or to putting a drug cartel out of business on the other end. These objectives are derived from the National Security Strategy, National Military Strategy, and national interests. Successful achievement of these objectives should lead to accomplishing the desired statement of conditions, or end state. The second question is What are the objectives of the enemy? In order to predict how and if our actions will change the enemy as desired, we must also know What is important to them? What are their values? What will they fight to the death to preserve. This information is required to evaluate center of gravities for possible action against them and provide insight to the question Why War?. Once an understanding is had on Why War?, then we can begin the next phase, How War? Colonel John Warden summarizes this point well when he wrote "At the strategic level, we obtain our objectives by causing such changes to one of or more parts of the enemy's physical system that the enemy decides to adopt our objectives, or we make it physically impossible for him to oppose us. The latter is called strategic paralysis."3

When examining the concept of Center of Gravity, a clear and concise definition of the term is required. In On War Carl von Clausewitz wrote that the first task in war planning "is to identify the enemy's centers of gravity and, if possible, trace them back to a single one." He identified the COG as the most important strength of an enemy, "the hub of all power and movement, on which everything depends...the point against which all our energies should be directed." Expanding on Clausewitz, Joint Pub 3-0, Doctrine for Joint Operations, identifies COGs as the "foundation of capability...those

characteristics from which a military force derives its freedom of action, physical strength, or will to fight. In theory, destruction or neutralization of enemy centers of gravity is the most direct path to victory." The revised JCS PUB 1-02, Department of Defense Dictionary of Military and Associated Terms provides this definition "Centers of gravity are sources of mental, moral, or physical strength, power and/or will...." FM 100-5, Operations, defines COG as "the hub of all power and movement, which everything depends. It is that characteristic, capability, or locality from which the force derives its freedom of action, physical strength, or will to fight." The Air Force doctrine manual offers four definitions of center of gravity that are all from non-Air Force sources. These are similar to the Joint and Army definitions provided above. John A. Warden defines center of gravity in his book The Air Campaign as "...that point where the enemy is most vulnerable and the point where an attack will have the best chance of being decisive." The Marines doctrine manual MCDP 1 Warfighting, has recently changed the definition of center of gravity to "any important sources of strength." Previously, the Marines considered the center of gravity as a critical vulnerability using this definition "by the enemy's center of gravity we do not mean a source of strength, but rather a critical vulnerability."

Extensive research on this topic revealed a significant divergence on the actual meaning and definition of center of gravity. Most of the definitions found were similar to the writings of Clausewitz, who generally believed that the center of gravity is a strength. COL Warden take the opposite approach and look at the center of gravity as a vulnerability. A basic premise of this paper is that the actual definition of a center of gravity does not depend on whether it is a strength or a vulnerability, but does depend on what change is required upon it to achieve our objectives, and whether or not a change can in fact be made. This approach follows the Why War? logic presented earlier. To summarize this point of view, it is of little value to concern ourselves with searching for something that is either a strength of vulnerability unless we can affect change. The change we affect could be directed toward either one, if by conducting an analysis, we determine the target is suitable, acceptable, and feasible. For the purpose of this project, the definition for center of gravity that I propose is "The center of gravity is an element of a system that when action is taken upon it will result in a change that has a cascading impact on the entire system, resulting in furthering the achievement of stated objectives".

It is important to note that no attempt is made to differentiate between strategic, operational, and tactical centers of gravity. The current full spectrum environment of military operations coupled with the proliferation of information through technological innovations has blurred the distinction between levels of warfare. An action taken at the tactical level by a single soldier and publicized by our media can have strategic implications. A good example was the American soldier being dragged through the streets in Somalia. This event caused decision makers to make changes in strategic policy towards Somalia. Additionally, an assumption is made that there may be more than one center of gravity and each center of gravity may be comprised of several critical nodes. An example would be the enforcement mechanism of the system. If a determination was made that this was a center of gravity, then further analysis is required

to identify the critical nodes, such as command and control facilities, intelligence gathering capabilities, key weapon systems, and logistics support, that must be affected to cause the change you are looking for. Critical nodes which, if affected allow us to achieve, or facilitate achievement of our objective. This is because they are the keystones of the enemy's resistance to achieving their objective. The proposed model at Figure 1 provides a simplistic method to identify, evaluate, and select change approaches for possible centers of gravities for any system being analyzed, at any level throughout the full spectrum of war.

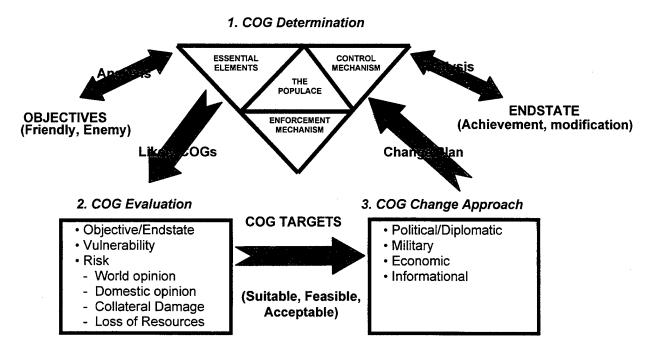


FIGURE 1 – JOINT STRATEGIC ANALYSIS MODEL (JSAM)

THE JOINT STRATEGIC ANALYSIS MODEL (JSAM)

The Joint Strategic Analysis Model (JSAM) found at figure 1 is proposed to assist military planners in not only identifying centers of gravity but evaluating them as possible targets that can be changed by applying instruments of national power against them. The model was designed for use on all types of possible situations found in the conflict spectrum. Recent experience has shown that the major theater war is not a frequent occurrence. However, many other types of situations have developed short of war that require strategic analysis and a change approach. While other models such as Warden's Five Ring Model might be useful for the traditional state or nation-state operations that we commonly categorized as our enemy, it is difficult to use for systems we have recently been exposed to. These include despot leaders in Kosovio, clan-based war in Somalia, insurgents in Bosnia, military leadership in Haiti, and international terrorism. Further, it has limited utility in international peacetime competition and crises short of war—the daily concerns of the National Command Authority, the State Department, the

CINCs and others at the strategic level. JSAM provides strategic planners a comprehensive tool for examining systems. When properly applied, this model assists in identification of critical nodes, and potential centers of gravity. Analyzing centers of gravity will still require the use of the determinants i.e.: (objective, vulnerability, risk, speed, collateral damage, and opinion).

The JSAM consists of three phases, COG Determination, COG Evaluation, and COG Change Approach. This phased approach was developed from Wardens Five Ring model approach that used seven steps, which was taught at the Air Command and Staff College in 1995-1996. The two major differences between Wardens Five Rings (figure 2) and the COG determination phase in the JSAM (figure 1) are the reduction of elements from five to four, and a change in the criticality of the four elements.

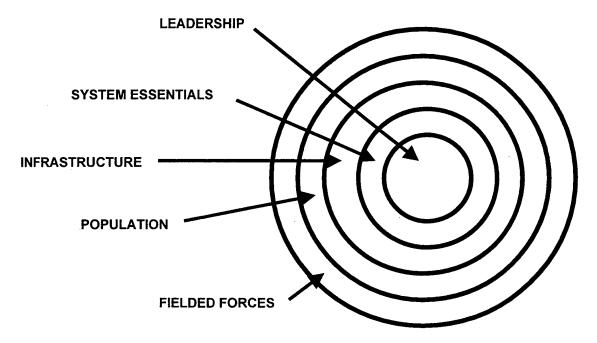


FIGURE 2 - WARDEN'S FIVE RING MODEL

Warden uses leadership, system essentials, infrastructure, population, and fielded forces as the five rings. JSAM uses control mechanism, essential elements, the populace, and enforcement mechanism. Warden's model is a set of concentric rings starting with leadership at the center and ending with fielded forces on the outer ring. This visually depicts the criticality of each element, for example leadership is the most critical part of any system and is appropriately placed at the center. Therefore, in an ideal situation, one would target the center ring or rings to get the biggest bang for your buck. The JSAM was developed on the basis that this assumption is not accurate. Joint Pub 3-0 is clear that centers of gravitiy are situation dependent and can change; it also implies that centers of gravity should reflect the enemy's perceptions of his greatest strengths, not US cultural biases. The JSAM does not identify the control mechanism as the most critical element. The model is designed so that the critical component of the system can be placed at the bottom of the triangle with the other three elements on the

top, symbolizing the balance that the critical element provides to the system. The key point is that all four elements are symbiotic, you cannot eliminate any one of the elements and still have a valid system. For example, to eliminate the population from the system would cause the system to collapse. Additionally, you cannot affect change to any one element in the system without affecting another. For example, targeting the population will most certainly affect an essential element or the enforcement mechanism. An important conclusion from this line of reasoning is that targeting of a center of gravity must be determined using the determination factors mentioned above. The determination process can only be used to assist planners to identify centers of gravity, not in prioritizing which center of gravity to target first.

A definition of each JSAM element is provided below:

Control Mechanism: By definition all systems have some kind of organizing center. At the center of every whole system and every subsystem is an element that provides strategic direction and purpose. This would normally imply the system's leadership, but provides a broader definition to include systems where the leadership does not necessarily exercise control of the system. This would include any person or organization, including allies or other external forces, that has significant control over the system's leadership. The recent conflict in Haiti provides us with a good example. Although the recognized leadership of the country was the President, the control was in the hand of General Cedras. Throughout history, wars have been fought to change the leadership of organizations, to induce them to make concessions, or to make them incapable of leading, to make them do your will. This definition provides an easily understood category for identifying all factors that relate directly to controlling the system. Essential Elements: This element combines two elements in Warden's five ring model, system essentials and infrastructure. These two areas result in great confusion when using Warden's model. It is often necessary to make capricious classification judgments which add little to one's understanding of how the system functions. The definition of essential elements is very similar to Warden's system essentials. They are those facilities or processes without which the state or organization cannot maintain itself. This could include all aspects of the economy, as well as the resources required to sustain production or sustain a military force. Destruction or neutralization of essential elements could lead to the collapse of the system and makes it physically difficult or impossible to maintain a policy or to fight. This definition also includes physical infrastructure such as rail lines, air lines, highways, bridges, airfields, and ports. If an infrastructure element(s) is so critical to the system and fits into the definition mentioned above then it should be an essential element. If it is not critical then it should not be considered during the analysis at that time. This is not to say that an infrastructure element might not be important when doing an operational or tactical analysis on a sub-element of the system. A brief analysis of North Vietnam during our involvement provides a good example of this. When looking at the overall system of the country, the infrastructure element electric production was not critical to the nation so it should not be included as an essential element; it is not a center of gravity. To list this and consider it for targeting would not produce successful results because destroying electric production in an under industrialized

nation like North Vietnam would have little or no effect on the system. When analyzing a sub-element of the system like command and control, electric production might be an important element.

The Populace: As the title of this element would suggest, the population of a country would fall in this category. However, this element includes other people of a system that are not necessarily part of the system's population. Warden's population element infers that this element must include people that are a part of the systems population. This may not always be the case. For example, a drug cartel's populace may include customers all over the world. Insurgents assisting in the downfall of a government is included in the populace, but not necessarily the population of the system. Morality set aside this is an extremely difficult ring to attack. There are many targets, and the population may be willing to suffer tremendous losses before it would consider turning on its government or system. Human nature is extremely difficult to predict and an indirect approach to the population such as Psychological Operations is probably worth considering but the outcome is difficult to predict.

Enforcement Mechanism: The enforcement mechanism protects the interests of the control mechanism or threatens those of an adversary. It provides both internal and external security. This is any force or threat of force used to influence the actions of the populace or an external state or non-state entity. It also provides for the system's protection, and gives the control mechanism a tool to do its will. Gang members in Los Angeles would be the enforcement mechanism for the gang (the system). IRA terrorists would be the control mechanism for the Sinn Fein. The Fielded Forces definition used by Warden implies organized military forces involved in combat. This definition takes into consideration the reality of a changing world with new and sometimes unidentified threats and the internal strife found in many countries of the world today. JSAM also recognizes that enforcement mechanisms may have more symbolic power than physical power. In the case of North Korean, North Korean nuclear weapons would have little military utility outside of deterrence. It is improbable that they would use them in an attack into South Korea. Yet, North Korea's potential possession of nuclear weapons not only threatens the South, but also commands world attention, especially that of the great powers of the US and Japan, and provides a political bargaining chip. A system may make concessions if the enforcement mechanism is reduced or destroyed because it has lost its capability to protect. Technology has made it possible to have new political options that put fielded forces into the category of means not ends.

COG EVALUATION AND CHANGE APPROACH

This discussion of centers of gravity leads logically to the business of determining which center of gravity should be affected and what tools are available to do this. To determine if efforts should taken to target a center of gravity it must meet the criteria of suitability, feasibility, and acceptability. The proposed model identifies three evaluation criteria used for this purpose that are called determinates. Once a thorough analysis of the adversaries system is complete and possible centers of gravity are identified, the next logical step is to evaluate these for possible action to effect change upon them. Maj. Paul Moscarelli in his paper, "Operational Analysis -- An Overview." presented three determinates that can be used to

conduct this evaluation.¹⁵ These determinates provide an organized approach for evaluating the suitability, acceptability, and feasibility of possible centers of gravities and determine if continued action should be taken. These are:

Objectives or End State: Degree to which affecting the center of gravity supports the objective pertaining to the system, and the overall strategic objective. This is our return on investment for targeting the center of gravity. In determining the degree to which affecting center of gravity supports the objectives, several key questions must be answered:

- Will affecting the center of gravity achieve, or facilitate achievement of the objective for the system being analyzed?
- What is the total effect on the enemy of striking the center of gravity, that is, on all systems affected by the center of gravity. What is the effect of failure of the subject system on the system as a whole?
- How important is the system or systems to achieving our strategic objectives? To what degree is the strategic objective supported by the total effect of targeting this center of gravity and this system?
- Would change of this system provide additional vulnerabilities or reduce our risk and enable
 pursuit of other strategies that more directly support the strategic objective? An example of this is
 an attack on enemy air defense which reduces the risk inherent in attacking remaining enemy
 systems.

Vulnerability: Degree this system is susceptible to our current capabilities to project power. Military, Economic, Political, Informational? This assessment would include items such as:

- Friendly capabilities: Do we have the resources to affect change on this center of gravity?
- Hardness: Is the center of gravity hardened to an extent that change would be difficult?
- Mobility: Can mobility increase or decrease the vulnerability of the center of gravity?
- Alternatives or work arounds: If change is successful, can a work around make the change ineffective?
- Redundancy: Are other elements of the system available that can accomplish the same thing as the center of gravity if change is effective.
- Regeneration capability: Can the efforts of the center of gravity be replace so quickly that change would have a minimal impact?
- Time required to affect: How long would it take for the change to become effective?

Risk: The extent an attempt would affect this system and expose a vital asset of ours to a high degree of risk? This can be thought of in terms of risk to your political, military, economic, and informational instruments of power. Is there a less risky way to affect the system and achieve the same objectives and end state? What is the potential cost of failure when attempting to influence this system? Do we have an adequate back-up system for any asset being put at risk? Or do we care if there is a backup. This includes considerations such as:

- World opinion: To what degree will affecting this system impact other's opinions?, domestic?, regional?, global?, How will affecting this critical node affect our own national will?, How will this affect our allies?, How will this affect our adversary's national will or their allies?, How will this affect non-aligned actors?
- Domestic Opinion: What will be the impact on domestic opinion if the center of gravity is affected, Will the "will of the people" support this effort?, Is this action supported politically?
- Collateral Damage: What is the potential for causing unplanned or unwanted collateral effects? Social? Cultural? Environmental? Economic?, What is the scope of the collateral damage expected?, Are their other options available which would achieve the same objective without collateral damage?, Is the collateral damage repairable or replaceable?, Will the damage have an impact on national will or world opinion?
- Loss of resources: How significant will the loss of resources be if the change approach selected failed?, Can the resources be easily replaced?
- Operations Security: Will this course of action give the opponent useful information about your capabilities that he may use to defeat you?

Once possible centers of gravity are identified, a change approach must be selected. An overarching premise of this paper is that strategic objectives can be achieved in all operations found in the conflict spectrum through identification of centers of gravity and the synchronized application of all instruments of power--diplomacy, information, military, and economics against those centers of gravities. These determinates will allow planners to determine if targeting a center is suitable, feasible, and acceptable. The third step in the JSAM model is to select a change approach that will significantly impact the center of gravity you are targeting. The instruments of national power provide an excellent framework for detailed analysis of possible courses of action. A summary of various tools for each instrument is shown below:

Political/Diplomatic	Economic	Military	Informational
Diplomacy	Trade policies	War	Propaganda
Summit meetings	Sanctions	Military Operations	Psychological
		Other than War	Operations
		(MOOTW)	
Ideology	Foreign aid	Insurgency	Public Information
Reform movements	Alliance negotiations	Counterinsurgency	Cultural relations
Treaty	Coalition negotiations	Counter terrorism	Cyber warfare
Agreements	Frozen bank accounts	Peace keeping	Electronic warfare
Negotiations	Embargos	Peace enforcement	
UN resolution		Counter drug	

TABLE 1 - INSTRUMENTS OF NATIONAL POWER

APPLICATION AND STRATEGIC IMPLICATIONS

The threat of a nuclear-armed North Korea (KN) remains one of the Clinton Administration's greatest foreign policy challenges. In October 1994, the US and KN reached an "Agreed Framework" as a step toward solution of the problem. The agreement was widely criticized at home and abroad. An analysis of KN centers of gravity, suggests the agreement offers the best opportunity for crisis resolution.

There are three stated objectives of US policy toward KN: stop the existing nuclear program, pursue efforts to eliminate the KN nuclear threat (thereby bolstering the Nonproliferation Treaty) and reduce the dangers from KN conventional military forces, bring KN out of its international isolation, reducing tensions in the region. ¹⁶ To accomplish these objectives, the administration is using all of the instruments of power, continuing negotiations with KN, working with allies and international agencies to implement the agreement, and increased our military preparedness on the peninsula by the deployment of more advanced weapon systems (AH-64 helicopters, Bradley fighting vehicles and Patriot SAMs). ¹⁷ As the key diplomatic effort, the Agreed Framework offers KN the incentives of the construction of lightwater nuclear reactors by 2003, the provision of heavy oil as an alternative in the meantime, and the promise of normalized US/KN relations if KN adheres to its obligations (a significant economic and diplomatic gain for KN). In return, KN agreed to immediately freeze of its nuclear program, to not reprocess spent nuclear fuel, to remain a signatory of the Nonproliferation Treaty (NPT), and to cooperate with the International Atomic Energy Agency in disclosure of past nuclear activities and inspections. An analysis of North Korea as a system using the JSAM verifies the wisdom of US policy and suggests that adherence is clearly in KN's best national interests. Step one is Center of Gravity Determination.

Control Mechanisms: In the upper right side of the COG Determination Triangle (Figure 3) is the KN leadership of Kim Jong II and other high ranking members of the Korean Workers Party (KWP), many of them Kim's relatives.

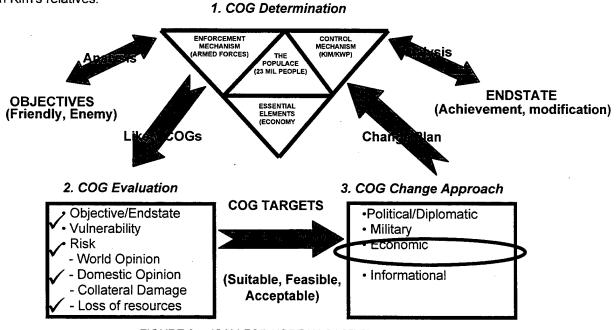


FIGURE 3 - JSAM FOR KOREAN CASE STUDY

Though his personality cult is not yet as pervasive as that of his father, Kim II-Sung, who died in July 1994, Kim Jong II has solidified his control of the country. Appointed as Chairman of the powerful Military Committee of the KWP (and Chairman of the National Defense Committee - the formal, rubber-stamp, government body in KN's parallel structure) by his father, it meant he was supreme commander of the armed forces and a member of the five-person Presidium of the Political Bureau prior to his father's death. Upon his father's death he immediately assumed the role of General Secretary of the KWP, and later the formal government position of President. Through the KWP-controlled government apparatus, Kim Jong II maintains control of all facets of KN society. This centralized, totalitarian structure is actually a benefit for US policy makers. They can focus all efforts on persuading Kim Jong II and a select few decision makers without consideration of opposition politics.

Enforcement Mechanisms: After a cursorily analysis and without using the determinates to ensure suitability, feasibility, and acceptability, if we were to identify a single center of gravity for the system of North Korea, this would be it. The KWP ensures domestic security through repressive measures of the Ministry of Public Security (a police force), and the State Security Department ("secret police"). Helping them are nets of informants located throughout society. Dissent in KN is unheard of and almost impossible.

While the internal security services are the KWP's enforcement mechanisms for KN society, the armed forces are, according to a South Korean scholar, "the largest single component of national security" and "the keystone of their [KWP's] past, present and future power." The forward deployed million-man ground forces and the largest SOF force in the world are a deterrent and an intimidating threat. However, it is the Nuclear, Biological, and Chemical (NBC) capability and improving delivery means that threaten to destabilize the entire region, e.g., Nodong-1 SSM can target most of Japan. To counter this threat and reassure our allies, the US deployed Patriots to South Korea (KS).

US diplomats realized that the nuclear threat has greater political significance to KN than military importance. It is the only bargaining chip available to gain fuel, food and money to forestall eminent economic disintegration and, perhaps, to ensure the regime's survival. Long, difficult negotiations and KN intransigence will continue -- but the US and KS hold the better cards in the long term.

Essentials Elements: The economy falls into this category and is a significant COG because 25% of the gross domestic product KN spends on its military (compared to 3% in the US and KS). ¹⁹ Driven in part by its weapons industry, heavy manufacturing is the only well-developed sector of the economy. To support this manufacturing, the infrastructure emphasis has been on fuel for industry, primarily coal extraction and hydroelectric power. Other elements of the infrastructure, such as a primitive road network, were neglected. Economic output declined from 1989 to the present. In 1992, the last year information was available, a drop of 7-9% occurred. ²⁰ Critical fuel shortages, particularly in oil, severely disrupted industrial production. This is a result of KN's increased isolation in the world. With no domestic oil reserves, KN relied on the USSR and China (and now Iran) for oil imports. After the Soviet collapse,

the new Russian government abrogated its alliance and demanded hard currency in future transactions, causing a plummet in imports in 1991. China also demanded hard currency for commercial trade in 1992. Another cause of the economic tailspin is antiquated manufacturing technology. Despite its Marxist-inspired chuch'e (self-reliance) ideology, KN turned to trade with Japan in the 1960s to obtain modern technology. Because of default on foreign debts in the 1980s, and numerous structural disincentives, recent foreign investment dwindled. Finally, six years of poor harvests and weak distribution means resulted in chronic food shortages and reports of starvation in some outlying areas.

The Populace: KN's 23 million people man its security forces and provide cheap labor to work fields and factories. From a US strategy perspective it is insignificant. Given the KWP's solid control of society, the diminutive KWP-controlled "mass" media, the Confucian influence that rewards subservience, and a historical precedent of enduring deprivation, any near-term US or KS efforts to influence the KN population are only likely to antagonize Kim Jong II and others in the KN elite.

To summarize, using Step 1 of the JSAM I have identified four possible centers of gravity; the leader Kim, the Armed Forces, the economy, and the population of 23 million people. I will now use step 2, Center of Gravity Evaluation, of the JSAM to assess the suitability, feasibility, and acceptability of affecting them.

Having identified numerous possible centers of gravities in my initial analysis of the system, I must determine which ones should be selected for a change action that if affected allows us to achieve, or facilitate achievement of our objective. In order to continue analysis of the centers of gravity identified above they should satisfy the three criteria identified by Major Moscarelli²¹. These are; degree to which affecting the critical node supports the objective, vulnerability of the center of gravity, and risk inherent in affecting the center of gravity. A summary of this analysis is provided below. The (+) or (-) indicates a positive or negative response to the determinate as described above. The overall rating at the bottom indicates only the total number of positive indicators for each possible center of gravity. These will be compared later to determine which center of gravity should be looked at for a change approach, which is step three of the JSAM model.

Objective - Will affecting the center of gravity support the objective?

Centers of Gravity	Kim/KWP	Armed Forces	23 Million People	Economy
Objective				
Objective	(+) Targeting Kim	(+) Targeting	(-) Targeting	(+) Targeting
Achievement	would meet	military forces	population would	economy meets
	objective provided	would meet	meet objective	objective.
	that new leader is	objectives	provided people	Consider
	willing to meet US	provided complete	revolt against	economic
	demands	destruction is	government	implosion as a
		successful		reason for
				aggressive action
	ł .		· ·	

Centers of Gravity	Kim/KWP	Armed Forces	23 Million People	Economy
Total Effect on	(+) Elimination of	(+) Destruction of	(+) Changing the	(+) Changing the
System	Kim would have a	armed forces	will of the people	economy would
	significant impact	would have a	would have a	have a significant
		significant impact	significant impact	impact
Importance &	(+) Very important,	(+) Very important,	(+) Very important,	(+) Very important,
degree objective is	high degree of	high degree of	high degree of	high degree of
supported	support for	support for	support for	support for
	objective	objective	objective	objective
Change improves	(+) Disruption of	(+) Elimination of	(+) Popular	(-) Implosion and
vulnerability/reduces	military command	regional threat	support to	possible offensive
risk	and control	·	eliminate current	action / last resort
			leadership	
Total	(4+)	(4+)	(3+)	(3+)

TABLE 2 - COG OBJECTIVE ANALYSIS

Analysis of the four centers of gravities against the objective determinate indicates that they all satisfy the objective to some degree with Kim and the Armed Forces higher than the rest. Targeting the population and economy would not prove as effective, but ultimate achievement of objectives is possible. The next determinate is vulnerability.

Vulnerability – How vulnerable is the center of gravity to change?

Center of Gravities	Kim/KWP	Armed Forces	23 Million People	Economy
Vulnerability				
Friendly capabilities	(+) Have some	(+)Have extensive	(-) Have limited	(+) Have extensive
	capability to affect	capability to affect	capability to affect	capability to affct
Hardness	(-) Very hardened,	(-) Some hardened	(+) Not hardened	(+) Not hardened
	difficult to target	can target	can target	can target
Mobility	(-) Very mobile	(-) Very mobile	(-) Very mobile	(+) Not mobile
Alternatives/workarounds	(-) Some	(-) Some	(-) Many	(+) Limited
	alternatives	alternatives	alternative	alternatives
	available	available	available	available
Redundancy	(+) Limited	(-) Some	(-) Extensive	(+) Limited
- -	redundancy	redundancy	redundancy	redundancy
Regeneration capability	(+) No capability	(-) Extensive	(-) Extensive	(+) Limited
		capability	capability	capability
Time required to affect	(+) Little time	(+) Some time	(+) Significant time	(-) Little time
	required	required	required	required
Total	(4+)	(3+)	(1+)	(7+)

TABLE 3 - COG VULNERABILITY ANALYSIS

The vulnerability analysis of the centers of gravity concluded that the economy and Kim were vulnerable to change and the Armed Forces and population were not as vulnerable. This conclusion does not eliminate these centers of gravity from further consideration. However, appropriate consideration must be given when selecting a change approach as to the amount of effort required to affect change on them. The last determinate is risk.

Risk - Amount of risk inherent in affecting a particular center of gravity?

Center of Gravities	Kim/KWP	Armed Forces	23 Million People	Economy
Risk				
World opinion	(-)	(-)	(-)	(+)
Domestic Opinion	(-)	(-)	(-)	(-)
Collateral damage	(-)	(-)	(-)	(-)
Loss of resources	(-)	(-)	(-)	(+)
OPSEC	(-)	(-)	(-)	(+)
Total	(0+)	(0+)	(0+)	(3+)

TABLE 4 - COG RISK ANALYSIS

The analysis of the risk determinate clearly shows that targeting all the centers of gravity with the exception of the economy will be extremely risky. There is a great possibility for causing unplanned or unwanted collateral damage and the loss of valuable resources could be significant.

A summary of total scores for each of the three determinates is found at Table 5. Evaluating each center of gravity using the determinates has shown that the Economy (total score 12+) provides a center of gravity that is feasible, suitable, and acceptable to affect change upon it. This does not imply that the other centers of gravity are not valid, only that affecting change upon them would result in second and third order effects that may prove undesirable with regards to risk and vulnerability. The economy is extremely vulnerable and the risk will have a minimal effect on our political, economic, military, and informational instruments of power. Although changing the economy does not satisfy the objective determinate as well as the other three centers of gravity, using a wholistic approach and considering other important factors such as vulnerability and risk, the Economy is a good selection to change.

Summary - Total for all determinates

Center of Gravities	Kim/KWP	Armed Forces	23 Million People	Economy
Objective	4+	4+	3+	2+
Vulnerability	4+	3+	1+	7+
Risk	0+	0+	0+	3+
Total	8+	7+	4+	12+

TABLE 5 - DETERMINATES SUMMARY

The final step is to select an appropriate change approach that will achieve the object and cause change upon the selected center of gravity. The economic instrument of power is the logical choice due to the nature of the center of gravity selected. The challenge to the US is to use this vulnerable center of gravity to our advantage. Economic sanctions are an option, but the potential consequences are dangerous. KN collapse ("hard reunification") would cost KS up to \$400 billion and jeopardize ongoing economic development. The potential for collapse could also result in the war we seek to avoid. So the US negotiating position is sound. We offered the immediate incentive of heavy fuel, the intermediate incentive of inexpensive and efficient fuel from the light water reactors, and long term incentive of potential foreign investment and improved standing in the world community. This approach will set the conditions to achieve the three stated objectives of US policy toward KN: stop the existing nuclear program, pursue efforts to eliminate the KN nuclear threat (thereby bolstering the Nonproliferation Treaty) and reduce the dangers from KN conventional military forces, and bring KN out of its international isolation, reducing tensions in the region.

CONCLUSION

This Strategic Research Project provides a new definition for center of gravity and develops the concept for the Joint Strategic Analysis Model (JSAM). The new definition does not attempt to answer the question that has been debated by academics for some time, Is a center of gravity a strength or a vulnerability? The answer is not provided because it does not add to the strategic thinking process used to develop strategies and plans for defeating an adversary. What does add value is determining what part of the enemy's system we can change that will have a significant impact in helping us achieve our objectives. The new definition "The center of gravity is an element of a system that when action is taken upon it will result in a change that has a cascading impact on the entire system, resulting in furthering the achievement of stated objectives", is used to develop a model that focuses on analysis of the enemy as a system. No attempt is made to differentiate between strategic, operational, and tactical centers of gravity. The proposed model can be used at any level and throughout the full spectrum of warfare. The JSAM is a simplistic tool that campaign planners can use to determine one or more centers of gravity, evaluate them for possible target application, and identify instruments of national power to affect change upon them. The systems analysis approach outlined in this paper is designed to reduce uncertainty and aid the warfighter in targeting the enemy to maximize the effectiveness of his resources. This allows the planner the ability to analyze the system as a whole and select the centers of gravity, which are most critical to the specific situation and facilitates the identification of actions best suited to a particular system. Thinking strategically about our adversaries will allow planners to develop suitable, feasible, and acceptable courses of action that are intricately linked to our objectives. This analytical process does not guarantee success but does provide a framework for logical thought about the subject.

WORD COUNT = 6031

ENDNOTES

- ¹ Samuel B. Griffith, <u>SUN TZU The Art Of War</u>, (Oxford, :Oxford University Press, 1963), 45.
- ² Carl Von Clausewitz, <u>On War</u>, trans. Michael Howard and Peter Paret (Princeton, New Jersey: Princeton University Press, 1984), 41.
 - ³ COL John A. Warden, "The Enemy as a System," <u>Airpower Journal</u> (Spring 1995): 43.
- ⁴ Carl Von Clausewitz, <u>On War</u>, trans. Michael Howard and Peter Paret (Princeton, New Jersey: Princeton University Press, 1984), 595-596.
- ⁵ Department of Defense, <u>Doctrine for Joint Operations</u>, Joint Pub 3-0 (Washington, D.C.: U.S. Department of Defense, 1 February 1995), II-20.
- ⁶ Department of Defense, <u>Department of Defense Dictionary of Military and Associated Terms</u>, Joint Pub 1-02 (Washington D.C.: U.S. Department of Defense, 1 December 1989), 63.
- ⁷ Department of the Army, <u>Operations</u>, Army Field Manual 100-5 (Washington D.C.: U.S. Department of the Army, June 1993), 6-7.
- ⁸ Department of the Air Force, <u>Basic Aerospace Doctrine of the United States Airforce</u>, Airforce Manual 1-1(Washington, D.C.: U.S. Department of the Airforce, March 1992), 275-276.
- ⁹John A. Warden III, <u>The Air Campaign Planning for Combat,</u> (Washington, DC: National Defense University Press, 1988), p9.
- ¹⁰ Department of the Navy, <u>Warfighting</u>, MCDP 1 (Washington, DC: Department of the Navy, HQUSMC, 20 June 1997), 47.
- ¹¹ Department of the Navy, <u>Warfighting</u>, FMFM 1 (Washington, DC: Department of the Navy, HQUSMC, 6 March 1989), 85.
 - ¹² COL John A. Warden, "The Enemy as a System," <u>Airpower Journal</u> (Spring 1995): 44.
- ¹³ The ideas in this paragraph are based on remarks made by a Facilitator Instructor participating as a member of the Air Command and Staff College (ACSC) faculty, academic year 1995-1996.
- ¹⁴ Department of Defense, <u>Doctrine for Joint Operations</u>, Joint Pub 3-0 (Washington, D.C.: U.S. Department of Defense, 1 February 1995), III 20-21.
- ¹⁵ Paul Moscarelli, "Operational Analysis: An Overview," in <u>Strategic Studies Course Book</u>, vol. 2, 522-530. Maxwell Airforce Base, Al: Air Command and Staff College, 1995.
- ¹⁶ Christopher, Warren, USSECSTATE, "Ensuring Peace and Stability on the Korean Peninsula," Remarks to Korea-America Friendship Society, Seoul, Korea, November 9, 1994, US Department of State Dispatches. November 14, 1994: 757. (3: 757; 4: 54-57; 6:53; 15: 1-5)
- ¹⁷ William Perry, USSECDEF, "Diplomacy, Preparedness Needed to Deal with North Korea," Remarks to the Asia Society, Washington, D.C., May 3, 1994, Defense Issues, May 16, 1994; 1-5.

- ¹⁸ An, Tai Sung, North Korea: A Political Handbook (Scholarly Resources Inc, Wilmington, DE, 1983), 45.
- ¹⁹ William Perry, USSECDEF, "Diplomacy, Preparedness Needed to Deal with North Korea," Remarks to the Asia Society, Washington, D.C., May 3, 1994, Defense Issues, May 16, 1994: 1.
- ²⁰ U.S. Central Intelligence Agency, <u>The World Factbook 1994</u> (Washington D.C.: USGPO, 1994), 217.
- ²¹ Paul Moscarelli, "Operational Analysis: An Overview," in <u>Strategic Studies Course Book</u>, vol. 2, 522-530, Maxwell Airforce Base, Al: Air Command and Staff College, 1995.
 - ²² "In South Korea, A Different Kind of Dread," <u>Business Week</u> July 25, 1994: 42-43.

BIBLIOGRAPHY

- Clausewitz, Carl Von On War, trans. Michael Howard and Peter Paret, Princeton, New Jersey: Princeton University Press, 1984.
- Griffith, Samuel B., SUN TZU The Art Of War. Oxford, :Oxford University Press, 1963.
- "In South Korea, A Different Kind of Dread." Business Week July 25, 1994: 42-43.
- Moscarelli, Paul "Operational Analysis: An Overview," in <u>Strategic Studies Course Book</u>, vol. 2, 522-530, Maxwell Airforce Base, Al: Air Command and Staff College, 1995.
- Perry, William, USSECDEF, "Diplomacy, Preparedness Needed to Deal with North Korea," Remarks to the Asia Society, Washington, D.C., May 3, 1994, Defense Issues, May 16, 1994: 1-5.
- U.S. Central Intelligence Agency, The World Factbook 1994. Washington D.C.: USGPO, 1994.
- U.S. Department of Defense, <u>Doctrine for Joint Operations</u>. Joint Pub 3-0. Washington, D.C.: U.S. Department of Defense, 1 February 1995.
- U.S. Department of Defense, <u>Department of Defense Dictionary of Military and Associated Terms</u>, Joint Pub 1-02. Washington D.C.: U.S. Department of Defense, 1 December 1989.
- U.S. Department of the Air Force, <u>Basic Aerospace Doctrine of the United States Airforce</u>, Airforce Manual 1-1. Washington D.C.: U.S. Department of the Airforce, March 1992.
- U.S. Department of the Army, <u>Operations</u>, Army Field Manual 100-5. Washington D.C.: U.S. Department of the Army, June 1993.
- U.S. Department of the Navy, <u>Warfighting</u>, FMFM 1. Washington, DC: Department of the Navy, HQUSMC, 6 March 1989.
- U.S. Department of the Navy, <u>Warfighting</u>, MCDP 1. Washington, DC: Department of the Navy, HQUSMC, 20 June 1997.
- Sung, An Tai. North Korea: A Political Handbook. Scholarly Resources Inc: Wilmington, DE, 1983.
- Warden III, John A. <u>The Air Campaign Planning for Combat</u>. Washington, DC: National Defense University Press, 1988.
- Warden, COL John A. "The Enemy as a System." Airpower Journal (Spring 1995): 43.